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ABSTRACT

To explore the relationship between prenatal parental stress and pregnancy outcome, this study investigated the hypothesis that parents of infants with defects would report greater amounts of stress in the year prior to their infant's birth than would parents of normally developing infants. Data on levels of parental stress were obtained from 37 marital pairs who had delivered infants with birth defects. Parental stress was assessed on a control group of 37 marital pairs who delivered a child with no birth defects. Both groups were similar in age, marital status, economic status, and the age of their infants, which was less than 6 months. Commonly experienced family stressors were assessed for both groups. Significantly higher levels of family stress were found in the individual and combined parental stress scores of the parents who had delivered infants with birth defects. Parents of normally developing infants were asked to identify use of stress management techniques. Those who experienced stress identified positive stress management techniques, and indicated that support systems, particularly family members, were most useful. Implications of the findings for nursing practice are discussed. The survey instruments and a 33-item reference list are appended. (Author/RH)

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# THE RELATIONSHIP BETWEEN PRENATAL PARENTAL STRESS AND PREGNANCY OUTCOME

by

Joanne E. Neihardt

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ABSTRACT

NAME: Joanne E. Neihardt APPROVED BY M. Hickman
MAJOR: Adult Mental Health APPROVAL DATE 4-20-84
DEGREE: Masters of Science in Nursing
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THE RELATIONSHIP BETWEEN PRENATAL PARENTAL STRESS AND PREGNANCY OUTCOME

Since bibical times (Luke 1:44) literature has documented the effects of prenatal parental emotions on the developing fetus. Recent literature (Ferreira 1965, Zax 1977, Very 1981) indicates a relationship between prenatal parental stress and the subsequent birth of an infant with defects. The purpose of this study was to investigate the relationship between prenatal parental stress and pregnancy outcome. It was hypothesized that parents of infants with defects would report greater amounts of stress in the year prior to the infant's birth than would parents of normal infants.

Data on levels of parental stress were obtained from 37 marital pairs who had delivered infants with birth defects. Parental stress was assessed on a control group of 37 marital pairs who delivered a normal child. Both groups were similar in age, marital status, economic status, and the age of their infants was under 6 months. Commonly experienced family stressors were assessed for both groups. Significantly higher levels of family stress were found in the individual and combined parental stress scores of the parents who had delivered infants with birth defects.

Parents of normal infants were asked to identify use of stress management techniques. Those who experienced stress identified positive stress management techniques, and indicated that support systems, particularily family members were most useful.

The positive relationship betweeen prenatal parental stress and pregnancy outcome has implications for nursing practice. Nurses have a unique opportunity to assess prenatal stress. Nurses can intervene to help to reduce both the amount and the effects of stress.

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# CHAPTER 1

## Introduction

The experience of pregnancy is commonly viewed as a stressful experience both for the mother and for the father. Prospective parents must adjust to changes in their relationship, their economic situation, and their personal, professional and daily routines may be changed. The mother must adjust to changes in her body and emotions. Folklore and tradition hold that a mother's emotions have an effect on the developing fetus. Recent studies demonstrate that the father's emotions may also play an important part in the fetal development(Verny, 1981). Sustained stress on the parents may contribute to the birth of an infant with birth defects(Clark, 1979; Ferreira, 1965; Huttman, 1978; Kuhn, 1982; Montagu, 1977).

In today's fast paced world, prospective parents are faced with multiple stressors. Due to the transient nature of modern society new parents

frequently lack the familial and community support systems which were available to other generations. Nurses can play an important role in the identification and management of stressors experienced by prospective parents. By reducing the amount of stress on prospective parents it may be possible that nurses can impact on the physical and psychological well being of the neonate. Implications for nursing are that nurses can assess prenatal clients for stressors and help clients to reduce and manage stress.

The purpose of the study was to compare prenatal parental stress levels experienced by parents whose infants were born with birth defects and those whose babies were normal. Additionally, helpful stress management techniques and support systems were addressed.

# CHAPTER II

## Review of the Literature

This chapter will present a review of prior studies relating to the effects of stress on the body, the effects of stress on the pregnancy and fetus, and the relationship between parental stress and pregnancy outcome.

### The Effects of Stress on the Body

#### Physiological changes with stress

Every individual experiences stress. Some stress can be beneficial and enable the individual to react to emergency situations. Low levels of nonpathological stress can enable the individual to function at a optimal level. However, this healthy equilibrium can be upset by a wide variety of psychological, physical, and environmental stressors. The resulting imbalance creates a dysfunction in one or more psychological or physiological systems, which then move toward a state hyperactivity, occasionally hypoactivity. When this state of stress triggered hyperactivity is prolonged, the individual becomes more vulnerable to negative life events, and

psychosomatic disorders(Pelletier, 1977. p.40).

The General Adaptation Syndrome

Selye described reactions to stress as the General Adaptation Syndrome (G.A.S). The G.A.S. has three stages: (1) alarm reaction, (2) resistance, and (3) exhaustion (Selye,1978).

In acute stress during the alarm reaction, the stress response prepares the body for "fight or flight". Hormonal and energy signals are involved to mobilize the body to meet the emergency. Heart rate, breathing, and perspiration increase. Epinephrine, norepinephrine, and cortisol are released. During the resistance stage of adaptation to stress, the signs of alarm are diminished or non-existent. However, resistances to noxious stimuli and illnesses increase above their normal levels. If stress is not managed or responses diminished the stage of resistance is followed by the stage of exhaustion. Resistance is diminished and exhaustion,illness ,or death may follow.(Selye, 1977).

In an acute situation, the stress response can save a life. In chronic stress the role and presence in the blood of corticoids from the adrenal cortex increase and assume more importance (Pelletier,

1977). If exposed to stress over a long period of time the body can develop diseases of the central nervous, the gastrointestinal,and the cardiovascular systems due to the circulating effects of the corticoids (Pelletier, 1977). Selye ( 1978) writes that it is generally agreed that the intensity and duration of the demand for adaptation to the stressor accounts for physiologic damage. A prolonged stress response contributes to chronic diseases such as diabetes, cancer, and rheumatoid arthritis (Hopping, 1980). The effects of the stress response are increased serum lipid and glucose levels, hypertension, decreased muscle protein and collogen synthesis, depressed immune system and retention of fluid. Individual responses to stress may be explained by differences in ages, sex, nutritional status, physical training, and pre-existing disease (Selye, 1976).

Hormones and Stress

The following hormones are involved to maintain homeostasis during the stress response: prolactin, growth hormone, anitdiuretic hormone, epinephrine, norepinephrine, glucocorticoids, angiotension II, mineralcocorticoid, and glucagon (Selye, 1978).

When the individual is stressed, the pituitary secretes large amounts of ACTH at the expense of growth hormone and prolactin. Prolactin and growth hormone secretion are decreased. Insulin synthesis and secretion are suppressed stimulating the release of free fatty acids to increase serum glucose and lipids and retain nitrogen. Selye (1978) cites the example of young animals that cease to grow, females who cease or have diminished menstruation, and lactating females who produce little or no milk under stress.

During stress antidiuretic hormone causes fluid retention by the kidney and constriction of vessels to increase blood pressure and circulating blood volume. Epinephrine increases glucagon and renin secretion, dilates muscle arterioles, dilates bronchioles, and decreases motility to the gastrointestinal tract. The actions of epinephrine decrease glycogen stores in the liver, increase angiotension II, serum lipids, lactate, blood supply, cardiac output, and oxygen supply. Anorexia and bowel dysfunction are stress related consequences of epinephrine.

Norepinephrine, a neuro transmitter, decreases

salivary and insulin secretion. Stress consequences are dry mouth and increased serum glucose. Norepinephrine action on glycogenolysis has the stress consequence of decreased glycogen stores in the liver. Actions on gluconeogenesis increases serum glucose. Constriction of arterioles causes pale cool skin. Sphincter constriction results in constipation and urinary retention. Increased perspiration leads to damp skin, possible loss of fluid and electrolytes.

Glucocorticoids increase gluconeogenesis, fluid retention and production of red blood cells. They decrease protein, collagen synthesis and inflammatory response. There is a lysis of lymphocytes and lymphoid tissue involution. Stress related consequences are: increased serum glucose, vascular volume, and blood viscosity, decreased immunity, walling-off of infection, muscle wasting, poor wound healing, possible G.I. ulcer, and disturbance of sleep-wake cycle.

Actions of angiotension II include vasoconstriction and stimulation of the synthesis and secretion of aldosterone. Stress consequences are increased blood pressure and serum aldosterone.

Mineralocorticoid acts to retain sodium and water and secrete potassium. During stress there is increased vascular volume and possible hypokalemia. Glucagon acts to stimulate hepatic glycogenolysis. Stress consequences are increased serum glucose levels (Hopping, 1980).

The stressed body will demonstrate the cumulative effects of changes in hormone secretion. The insulin antagonistic effects of norepinephrine, growth hormone and prolactin, increased glucagon secretion induced by epinephrine, gluconeogenesis mediated by cortisol, and glycogenesis induced by norepinephrine, all contribute to an increased blood sugar with possible glycosuria (Cryer, 1976; Hopping, 1980). Urinary retention due to bladder sphincter constriction, as a result of the action of norepinephrine, could be a stress induced problem. Diminished urinary output can occur due to the shunting of blood away from the kidney. Fluid retention could occur due to the activity of aldosterone and antidiuretic hormone.

In summary, stress is the nonspecific resonse of the body to any demand made upon it (Selye,1974). The effects of stress cause a body to respond in ways

that all body systems are affected. It is important to note that these effects of stress have been identified based on studies done on nonpregnant persons. One is challenged to consider the implications of the noted effects of stress on a pregnant woman and her unborn fetus.

The Effects of Stress on Pregnancy and the Fetus

Austin and Short (1972) report that there are many reasons for disturbance of normal fetal development. They can be placed under four groups: chromosomal errors, inherited defects, damaging agents, and maternal limitations. Damaging agents in the fetal environment may be toxic substances, or may be increased levels of naturally occurring substances. Maternal limitations which are likely to affect the fetus include vasoconstriction, malnutrition, and inadequate excretion. Stress can cause vasoconstriction, malnutrition and inadequate excretion.

The effects of maternal stress on pregnancy and the fetus have been described by Montagu (1977) and Verny (1981). They report that the effects of stress are detrimental only if the stress is of a long term personal nature. Montagu (1977) cautions the mother

that the chemicals and hormones released by the stress response will cross the placenta into the fetal bloodstream. Thus the fetus according to Montagu (1977), "receives in visable measurable form the force that begun as a subjective feeling in his mother" (p. 149). Research by Sontag (1941) demonstrated that deeply disturbed maternal emotions produce a marked increase in the activity of the fetus, probably as a result of the increased adrenalin level in the maternal and therefore, fetal blood. Studies by Montagu (1977), Sontag (1944,1946), and Stott (1957) detail the stress response mechanism and how it affects the fetus. Emotions and feelings begin in the maternal brain. From the brain neurochemical changes set off impulses which pass either to the autonomic nervous system or to the thalamus and the hypothalamus. The above researchers did not report how the data were gathered.

Hormones secreted as part of the stress response are capable of passing through the placenta into the fetal bloodstream. The placenta utilizes plasma borne precursors, specifically estrogen and C-19 steroids (Pritchard & MacDonald, 1980). Montagu (1977) states

that, "the end product of the original state of fear in the mother may be cortisone in the circulation of the child in quantities that may be harmful" (p.149). According to Sontag (1941), "Deeply disturbed maternal emotions produce a marked increase in the activity of the fetus, probably as a result to increased adrenalin level in the maternal and therefore, fetal blood" (p.996). Thus according to Montagu (1962) the mother and fetus share a "common endocrine pool" (p.4).

The fetus is susceptible to the harmful effects of stress upon the mother. The effects are direct in the placental transfer of hormones. Indirectly, yet potentially more significant, are the subtle effects of stress upon the mother's body and the relationship of her body and uterus to the fetus. Maternal stress related consequences such as hypertension, ulcers, decreased immunity, and arteriosclerosis cannot fail to impact on the fetus.

## The Relationship Between Parental Stress and Pregnancy outcome

Clark and Alfonso (1979) note that the event of pregnancy is, in itself, stressful to a woman's body. Pregnancy is also influenced by maternal and paternal age, nutrition, socio-economic factors,and maternal emotions. Based on research by Montagu(1962) and Sontag (1966), Clark and Alfonso (1979) suggest that:

1. Maternal emotions can modify fetal and neonatal behaviors.
2. Maternal emotions can affect the uterus, somtimes jeopardizing the pregnancy.
3. Maternal emotions can contribute to malformations (p. 610).

The belief that the maternal emotions have an effect upon the fetus permeates every society. Pregnant women are cautioned not to become "upset". They are told not to be frightened. Society seeks to protect pregnant women from disturbing sights and happenings. Spanish cultures caution against the

"evil eye". Birthmarks are often attributed to nefarious influences. Ferriera (1960) quotes a study done by Little in 1862 which relates causes of cerebral palsy and mental deficiency to "maternal impressions". To provide a historical perspective. Ferriera (1960) continues to quote studies by Dabney, (1889), Wallace, (1893), and Ballantyne, (1904), all of which conclude that there is a relationship between maternal emotions and pregnancy outcome. The quoted studies are old and it is assumed that they are descriptive studies based on clinical observations. The positive effects of prenatal experiences are also a part to society's tradition. In the Bible, Elizabeth exclaims, "For lo, as soon as the voice of thy salutation sounded in my ears, the babe in my womb leaped for joy" (Luke 1:44 ). While it is important to note the positive effects of maternal impressions, the remaining review of the literature will discuss findings which relate to the detrimental effects of prenatal parental stress upon a pregnancy.

Ferriera (1960) quotes Whitehead who in 1867 reported a case of convulsions in the fetus of a mother who was experiencing stress, "Severe physical

shocks such as falling from a height may leave the fetus unperturbed and unharmed. But it seems otherwise.....when the mental system of the mother becomes unbalanced by violent and sudden shocks of anguish or by prolonged or severe anxiety" (p. 555).

To quote Montagu (1977), " A woman who has had a difficult time during her pregnancy, whose life has been peppered with worrisome details and accidents, is quite likely to have a difficult child, one who is overactive and has trouble with his food and his elimination, who cries more and sleeps less" (p. 149). Montagu (1977) suggests that the infant may become "sensitized" to stress in the future or develop abnormal response patterns. Ferriera (1960) states, "fetal hyperactivity seems to be in itself a sign of fetal disturbance which relates not only with later encountered neurotic patterns, but also with the mother's state of stress during the pregnancy" (p.110).

Based on Project Athena, an ongoing study of women at West Point, Kinzer (1979) writes, "Old wife's tales, studies, fairly detailed observations in lying-in hospitals and self-reports indicate that

highly anxious women have problems conceiving, have high rates of miscarriage, and have high incidence of deformed or dead babies" (p.117).

While not based on research studies, Freeman (1982) writes that, "If the mother is grossly malnourished, or if her ability to mother (or the father's ability to assume the fatherhood role) is endangered by emotional or social inadequacies or stress within the family, both the parents and the child will be jeopardized" (p. 150). Freeman (1982) believes that, "Unusual stress - the death of a family member, marital difficulties, economic problems, or an overanxious or ubiquitous interfering mother or mother-in-law may start a series of reactions that can be harmful to mother and baby" (p.150).

Babson, Pernoll, Benda, and Simpson (1980) list stressful events, for example, severe emotional tensions as part of assessment for the high risk pregnancy. Bond and Landcaster (1980) write that pregnancy is inherently disruptive and may temporarily impair the individual's usual capacity to cope with changing environmental stresses. They add that the mother's mental health is significant both

prenatally and postpartally as it influences her care and the nuturance of the baby before and after birth. Kuhn (1982) counsels the nurse to assess adolescent maturational stresses and their impact on teenage pregnancy.

Gath (1977) reports that stressful experiences are implicated in the birth of an abnormal child. In the study, thirty families with newborn Down's Syndrome (which Gath calls mongol) babies were matched with thirty families with normal babies. Both groups were followed for eighteen months to two years and interviewed six times. From Gath (1977), "more fathers of mongols had longer periods off sick, and they included two men who had had serious industrial accidents. Two fathers in the mongol group had been admitted to a psychiatric hospital, for anxiety and hypomania, and one control father had been given out-patient psychiatric treatment for anxiety" (p. 406). In addition, marital breakdown or severe marital disharmony was found in 9 of the Down's families and in none of the control families. Although the author does not state if this was the case prenatally, it is logical to assume if there was marital and paternal psychological stress postnatally

it probably was present in some form during the prenatal period.

Strean and Peer (1956) examined the relationship between stress and the incidence of cleft palate in human infants. They found that severe emotional stress, particularly when associated with hyperemesis, appeared to be the most important single factor in the etiology of cleft palate. They explain, "Stressor agents are known to influence adrenal cortical activity...Excess of this hormone (hydrocortisone) inhibits fibroblastic proliferation and produces histochemical changes in collagen fibers" (p. 56).

A study done by Bahna and Bjerkedal (1974) looked at the course and outcome of pregnancy in 388 women with neuroses. They found nearly a doublefold incidence of toxemia, vaginal hemorrhage, hyperemesis, complicated labor, and multiple births. The incidence of infants born with Downs syndrome, central nervous system, and urogential defects was 10.9% for the neurotic mothers vs. 3.9% for a control group.

Herrenkohl (1980) has studied the effects of stress in laboratory rats. She has found that stress

hormones, in the body of a mother-to-be, may increase the chances for physical abnormalities in the offspring. They may form a hidden birth defect, which would cause female children to face a myriad of reproductive problems. The tests on rats who have ovaries similar to humans show that when there are too many stress hormones in the body of the fetus, particularly in the last trimester, certain abnormalities form in the brain, which will be regulating activity of the gonads later in life. A high proportion of the infants had cleft palate or harelip deformities. The daughters of the stressed rat mothers were infertile, miscarried, or endured high risk pregnanies. They had problems ovulating properly. The few that became pregnant they had stillborn offspring or long labors.

A classic study by Hutunen and Niskanen (1978) examined prenatal loss of father and psychiatric disorders in the infant. The results suggest that especially during months 3 to 5 and 9 to 10 of pregnancy, maternal stress may increase the risk of the child for psychiatric disorders, perhaps mediated through the inborn temperament of the child.

While their reports are not based on research

Avery and Trout are noted experts in the field of infant health. Avery (1978) reports that the mother who begins her pregnancy under stressful emotional conditions starts a cycle which may lead to a poor attachment after delivery. Her prenatal stress tends to be associated with more delivery complications and a higher incidence of difficult temperment in the offspring. Trout (1983) acknowledges the need for such mothers and infants to be identified as being at risk for psychiatric problems. He suggests early assessment and therapy for stressed families.

Based on a random sample of 187 live births Stott (1973) reported the effects of maternal emotions. He found that short term maternal upsets did not affect a child the same as long-term ones did. Long-term personal stresses had the most effect on the fetus. Long term stressors were described as continuous or liable to eruption at any time and they were incapable of resolution. Ten of the fourteen women who had long term stressors bore infants with physical or emotional problems.

A poor relationship between the parents of the fetus was rated as among the greatest causes of emotional and physical damage in the womb. Unhappy

marriages produced babies who were five times more fearful and jumpy as the babies of happy relationships (Stott, 1973). In a further study of over thirteen hundred children and their families, Stott (1977) reported that a woman in a troubled marriage runs a 237% higher risk of bearing a psychologically or physically damaged child than a woman in a secure relationship.

In summary, stress impacts on the body by alteration in hormone levels and by what Selye (1976) calls The General Adaptation Syndrome. Body energy is utilized to fight acute and chronic stress. Specific hormones are increased to fight acute stress. Other hormones are decreased, particulairly during long term or chronic stress. This is clearly and fullY documented in the literature. The connection between stress and the mother-father-fetus system is less well documented. Further indepth studies are needed. Perhaps as science becomes more refined in the techniques of placental transfer, the transfer of stress related hormones will be more fully documented. Clearly, as women continue to esculate their exposure to stressful events in the home and workplace, science will need to document the harmful effects of stress on the mother-fetus.

# CHAPTER III

## Conceptual Framework

To investigate the impact of stress on prospective parents two theories are used: Hans Selye's Theory of stress and Martha Roger's Theory of unitary man. Selye (1978) identifies stress as the nonspecific response of the body to any demands made upon it. The symptoms of stress are both biophysical and psychological. While a certain amount of stress is necessary for survival and well-being, prolonged or excessive stress that exceeds an individual's adaptive capacities may cause disequilibrium and lead to disease or other problems.

"Stressor" is defined by Selye as any experience or agent that may cause stress. Stressors arise from the person's physical, internal, or psychological environment. Stressors require a change in one's life and can be pleasant or unpleasant. What is perceived as stress by one individual may not be a stressor for another. The way in which one person perceives stress depends upon the power of the stressor, the support systems available, and the

coping mechanisms.

The concepts of Selye's (1978) theory include stress, stressor, General Adaptation Syndrome, and the body's general and specific defense mechanisms. The theory postulates that relationships occur between stress and the body's defense mechanisms which are activated to cope with the stress.

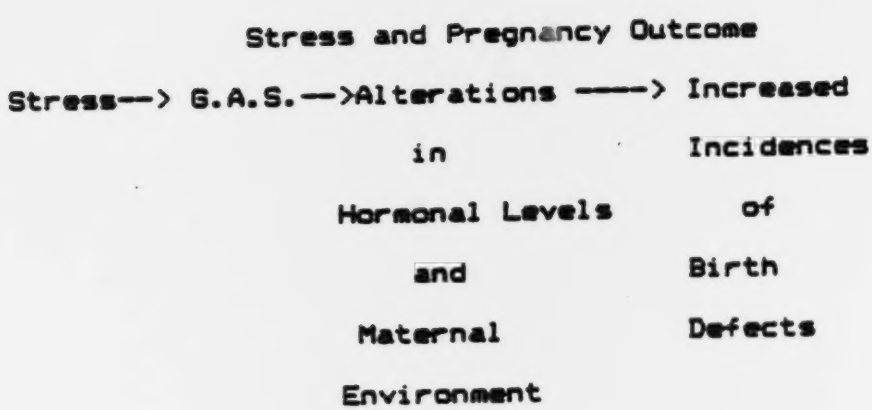
Selye (1978) considers the element of time in stress. He writes: "While stress is reflected by the sum of the nonspecific changes which occur in the body at any one time, the General Adaptation Syndrome encompasses all nonspecific changes as they develop throughout time during continued exposure to a stressor" (p. 79).

The G.A.S. consists of three stages: the alarm reaction, the stage of resistance, and the stage of exhaustion. The body reacts to stress in specific ways. Unless one is able to adapt or cope with the stress, vital energy will be depleted. As the body fights to cope with stress, hormone changes occur. The hormone and energy of the body shifts from a steady state to a readiness state- ready to fight the stressors. In a state of stress the body is able to function well for brief periods of time, for example

to enable one to respond to an emergency. However, if the stress is unremitting and of a long term nature the body's reserves of energy and hormonal levels are alterated.

The pregnant woman's body responds to stress with similar alterations of energy and hormone levels. If the pregnant woman and her spouse are confronted with unremitting stress the fetus is presented with a less than optimal environment. Body energy and hormonal levels that should be used to nuture the fetus are diverted to dealing with stress. It is within this stressful prenatal condition that fetal defects may occur (Verny, 45; Stott, 1977,331; Montagu, 148). The relationship between stress and pregnancy outcome is diagrammed in figure 1.

Figure 1


Stress and Pregnancy Outcome
Stress--> G.A.S.-->Alterations ----> Increased
in
Incidences
Hormonal Levels
of
and
Birth
Maternal
Defects
Environment

Martha Rogers (1981) writes that, "Unitary man (human field) is an irreducible, four dimensional, negentropic energy field identified by pattern and manifesting characteristics that are different from those of tha parts and which cannot be predicted from knowledge of the parts" (p.1). Rogers (1970) states, "Nursing aims to assist people in achieving their maximum health potential. Maintenance and promotion of health, prevention of disease, nursing diagnosis, intervention, and rehabilitation encompass the scope of nursing's goals" (p.86).

The concepts and the relational statements of Roger's (1981) theory are:

1. Energy fields: "Energy fields are postulated to constitute the fundamental unit of both the living and the non-living. Field is a unifying concept. Energy signifies the dynamic nature of the field. Energy fields are unbounded. Two energy fields are identified: the human field and the environmental field....they are open - not a little or sometimes but continuously open. The human and environmental fields flow through each other" (p.2). The pregnant woman is in interaction with the environment especially that of her spouse and her

developing fetus. Stressors that affect the mother and the father affect the fetus. The interaction of the energy fields is ever present.

2. Universe of Open Systems: As the above fields flow through each other Rogers (1981) writes,"A closed system model of the universe is contradicted and such concepts as equilibrium, adaptation, and steady-state are out-dated" (p.2). The pregnant mother-father-fetus system is an open system. Changes and stressors are in continual interaction. Within this open system framework ongoing assessment, implementation, and change are nursing process functions.

3. Pattern and Organization: Rogers (1981) writes, "pattern and organization identify energy fields. The nature of the pattern and organization changes continuously and innovatively" (p.2). The nurse assists the pregnant unit in stress identification and management. She assists the unit to move toward an ordered effective way to deal with stressors.

4. Four Dimensionality: Rogers (1981), "Four dimensionality is defined as a non-linear domain without spacial or temporal attributes." (p.2). In

implementing the nursing process the nurse assists the pregnant unit to cope with stress. This process has effect not only for the present but for the future. The nurse aids the pregnant family in identifying and managing stress. Consequently, the developing fetus is assured of a more conducive environment for growth and development.

Rogers' (1981) derives the following principles from her conceptual model, "The Principle of Resonancy states that the human and environmental fields are identified by wave pattern and organization manifested by continuous change from lower frequency wave patterns to higher wave patterns" (p.2 ). This implies that by assisting the pregnant unit, the nurse facilitates the movement to higher levels of functioning. It looks at variations of the whole life process. and ways to support or modify variations in the life process of the pregnant unit.

Rogers' (1981) writes, "The Principle of Helicy states the nature and direction of human and environmental change is continuously innovative, probabilistic, and characterized by increasing diversity of field pattern and organization emerging

out of the continuous mutual process between human and environmental fields and manifesting non-repeating rhythmicities" (p.2). The nurse and the pregnant unit reflect on the rhythmic life patterns. For example, a family would look at stressors and how they as individuals react to stress. This might include looking at how their parents handled stress and how the present generation can improve stress management. By identifying and managing stress the family would learn how to repattern their lives. In essence, they would not be repeating mistakes of the past or of previous generations.

According to Rogers (1981), "The Principle of Complementarity is inherent in the Principle of Helicy and exists to emphasize the continuous, mutual process between human and environmental" (p.2). As within systems theory, this implies a constant ongoing assessment of stress on the pregnant couple as they interact with the environment. As life continues, the parents are aware of stress and individually or with help will positively manage stress.

## Theoretical Definitions

Parental Stressor:

A parental stressor is any prenatal life experience that is preceived as stressful by the parent.

Parental Support Systems:

A parental support system is any stress reducing person or group of people that enable the parent to reduce or to manage stress.

Stress Management:

Stress management is the reduction of stress or the positive cpoing with stress with the end result of reducing the negative effects of stress on the individual body.

Defect:

A defect is a fault, imprefection, or deficiency occuring in the newborn.

## Hypothesis

The research hypothesis is: There is a difference in the amount or level of stressors experienced prenatally by parents who have normal infants and those whose infants are born with birth defects. Additionally, the following research question was addressed: What are the stress

management techniques and support systems identified as helpful by parents of normal infants?

## Summary

Stress occurs daily in varying degrees. The body responds to stress by energy output and by production and alterations in hormone levels. If the stress response is short lived or managed the effects of stress to the body are negligible and can be beneficial. However, if the stress is acute and not managed energy levels in the body are affected and can lead to exhaustion. If the stress becomes chronic excretion of corticoids plus depletion of vital growth hormones and prolactin wear down the body's systems and defenses.

The pregnant woman has, for generations, been sheltered from stressful events. Implications are that stressful occurrences cause the pregnant woman to use energy and alter optimum hormone levels to fight the stress at the expense of nuturing and protecting the developing fetus. It is within this stressed system that fetal defects can occur.

Nursing seeks to enable people to achieve their maximum health potential. Nurses can help the prenatal couple to assess stress in their environment. The prenatal couple is an open system

and can interact to reduce or manage stressors. As stress is effectively reduced or managed, the couple repatterns their response to stress. They are assisted to a higher or more effective pattern and direction of change. As stress is reduced, the harmful effects of stress on the developing fetus are lessened or eliminated.

This chapter has been devoted to an exploration of the conceptualization underlying the study. Clinical recognition, supported by the literature, of the effects of stress on the body provided the stimulus to consider the amount or levels of stressors prenatally experienced by a group of parents who had delivered an infant with birth defects in contrast to a group with a normal infant.

# CHAPTER IV

## Methods

### Design

The study utilized a descriptive design comparing amount of stress experienced by two groups of new parents. The study examined data related to parental stress in the year preceding the birth of an infant. Data on stress experienced by parents who subsequently gave birth to an infant with birth defects were obtained from a previous study (Horan, 1983). Data on stress in a group of parents who delivered a normal infant were collected specifically for this project.

### Sample

The sample for the study consisted of 74 couples. Thirty-seven couples had normal infants and thirty-seven couples had infants with birth defects. Parents of normal infants were recruited from the maternity unit of a midwestern teaching hospital. The hospital serves as a regional neo-natal intensive care center. It is located in a primarily resort community of 80,000.

The second group of 37 parents were referred for

genetic counseling because of a suspected defect in their infant. See Table 1 and 2 for the types of defects and etiological factors. It is important to note that of the thirty four etiological factors fourteen were of unknown reasons. High levels of stress may be one of the "unknown reasons". Subjects were recruited through three genetic counseling clinics and a diagnostic center for handicapped children. All are located in a midwestern industrial state. Two of the clinics are located within the Departments of Pediatics at two large state universities. The third is administered by a hospital medical center in a large city. The diagnostic center is in the same city under the intermediate school district (Horan, 1983).

Since both the study sites serve as referral centers for a large geographic area, the sample reflects a wide variety of cultural and social backgrounds. Ages of parents ranged from 19 to over 40 for the fathers and mothers in the group with normal infants and from 21 to over 40 for fathers and mothers who had had an infant with birth defects (Table 3). Family income, educational level, religious affiliation and occupation are presented in Tables 4 through 7.

Table 1

Type of Defect

| | Number of Infants |
|---|---|
| Congenital Heart | 2 |
| Chromosome | 13 |
| Club Foot | 1 |
| Central Nervous System | 5 |
| Genital | 1 |
| Miscellaneous | 12 |

n = 34

Note. Information unavailable for three infants.

(Horan, 1983, p.50).

Table 2

Etiological Factors

| | Number of Infants |
|---|---|
| Mendelian | 2 |
| Chromosomal | 15 |
| Multifactorial | 2 |
| Environmental | 1 |
| Unknown | 14 |

n = 34

Note. Information unavailable for three infants.

(Horan, 1983, p. 50)

Table 3

Parental Age for Two Groups

| | Birth Defects | | Normal Infants | |
|---|---|---|---|---|
| Age | Fathers[a] | Mothers[a] | Fathers[a] | Mothers[a] |
| 19-21 | | | 1 | 3 |
| 21-25 | 2 | 9 | 4 | 4 |
| 26-30 | 18 | 16 | 16 | 20 |
| 31-35 | 12 | 9 | 9 | 9 |
| 36-40 | 1 | 2 | 6 | 1 |
| 40 - | 4 | 1 | 1 | |

[a] n =37

Table 4

Yearly Family Income

| Average Income | Number of Families | |
|---|---|---|
| | a | b |
| | Birth defects | Normal Infants |
| $3,000 to $4,999 | 1 | 2 |
| $5,000 to $9,999 | 4 | 2 |
| $10,000 to $14,999 | 5 | 5 |
| $15,000 or more | 27 | 28 |

a n =74

b n =74

Table 5

Educational Status

| Educational Level | Number of Parents | |
|---|---|---|
| | Birth Defects[a] | Normal Infants[b] |
| Less than High School | 6 | 1 |
| High School Grad | 25 | 20 |
| Vocational Program | 1 | 2 |
| Some College | 27 | 19 |
| College Grad | 13 | 24 |
| Masters Degree | 1 | 6 |
| Doctorate | | 2 |

a n =73 one father did not provide information

b. n =74

Table 6

Religious Affiliation

| Religion | Number of Families | |
|---|---|---|
| | Birth Defects[a] | Normal Infants[b] |
| Catholic | 16 | 28 |
| Protestant | 43 | 26 |
| Jewish | 0 | 1 |
| Other | 6 | 5 |
| None | 4 | 11 |

a n =69

b n =71

Note. Not all parents responded

Table 7

Occupational Status

| Occupation | Number of Parents | |
|---|---|---|
| | a | b |
| | Birth Defects | Normal Infants |
| Professional/Technical | 11 | 25 |
| Managerial | 7 | 4 |
| Clerical | 2 | 4 |
| Sales | 6 | 2 |
| Craftsman | 5 | 0 |
| Operator | 10 | 1 |
| Laborer | 3 | 10 |
| Service | 22 | 17 |
| Farmer | 3 | 3 |

a n =69

b n =66

Note. Not all parents responded

## Procedure

For the group of parents who had infants with birth defects, existing records were used. Data on stress in the year prior to the birth of the infant were assessed by interview under the basic information section of a larger study (Horan, 1983). Potential subjects were identified by the individual at each study site who was responsible for referrals. After a verbal explanation of the study, permission was obtained for a home visit during which the data were collected. Recruitment of subjects was from June, 1981 to March 1983 (Horan, 1983).

For the group of parents with a normal infant, parents were contacted by referral from their physician and from the maternity nursing staff. Written permission was obtained from the parents after a verbal explanation of the study. While they were patients on the maternity unit, subjects were given the questionnaire to complete. After a brief period of time, the questionnaire was collected by the interviewer. At this time any questions were answered. Data collection was completed over a three week period in March 1984.

## Instrument

Parent Adjustment Project-Basic Information (See Appendix A) was used for parents who delivered an infant with birth defects (Horan, 1983). Data were collected concerning demographics and family stressors in the year prior to the birth of the infant. In addition, information about the pregnancy and the baby were collected. Parental Experiences (See Appendix B) was used for the group of parents with a normal infant. The stress related questions along with demographic items were taken from the Parent Adjustment Project Questionnaire (Horan, 1983). In addition, stress management techniques and support systems were assessed.

In both questionnaires, the parent was asked to respond to a list of nine commonly experienced family stressors indicating if the problem was encountered during the year prior to the baby's birth. All areas were stressors of a long term nature, that is the stressors that could not be coped with quickly. The stressor was likely to have long term and long nature effects on the family system. The nine areas identified as stressful were:

1. Loss of job: mother or father, both

2. Change of job: mother or father, both
3. Moving
4. Beginning school: mother or father, both
5. Finishing school: mother or father, both
6. Death of a significant person
7. Illness of a significant person
8. Problems with parent
9. If the pregnancy was not planned

The responses were yes or no. For items 1,2,4,5, yes scores were weighted one for mother, one for father,and two for both. For questions 3,6,7,and 8 yes was coded one. For question 9, no was a score of one. The numbered scores were then added to obtain a stress score for each individual. The possible range of stress scores was from 0 to 13.

Parents of a normal infant were asked if they were stressed during the year prior to the birth of their baby. They were then asked what they did when stressed. They were offered five options: talk, exercise, keep to self, cry, or the category other. They were asked to list additional stress management techniques in the category "other". They were asked to whom they turned to for support when stressed. The four options were: family member, professional,

church. and other. They were then asked if they were satisfied with the help from stress management and support systems.

# CHAPTER V

## Results and Discussion

### Results

The research hypothesis that there is a difference in the level of stressors experienced by parents prenatally who have normal infants and those whose infants are born with defects was supported. When comparing parents of infants with birth defects to the parents of normal infants, parental stress was significantly higher for both mothers and fathers of infants with birth defects ( $t=4.08$, $df=146$, $p<.001$, Table 8). A t-test revealed that prenatal stress between the two groups of mothers was significantly higher for the mothers of an infant with birth defects ( $t=2.41$, $df=72$, $p<.001$, Table 9). Prenatal stress was also significantly higher for fathers who had infants with birth defects ( $t=3.33$, $df=72$, $p<.001$, Table 10).

The most frequently reported stressor for parents of infants with birth defects was illness of a significant person (50%), with change of job (43%), and death of a significant other (34%) reported as

Table 8

Differences in Stress Scores for Two Groups of Parents

| mean | | | | |
|---|---|---|---|---|
| [a] Normal Infants | [b] Defective Infants | t | df | p |
| 1.50 | 2.64 | 4.08 | 146 | <.001 |

a n = 74

a n = 74

Table 9

Mother's Stress Scores

| Mean | | | | |
|---|---|---|---|---|
| a Normal Infants | b Defective Infants | t | df | p |
| 1.62 | 2.57 | 2.41 | 72 | p<.001 |

a n =74

b n =74

Table 10

Father's Stress Scores

| Mean | | | | |
|---|---|---|---|---|
| a Normal Infants | b Defective Infants | t | df | p |
| 1.37 | 2.70 | 3.33 | 72 | p<.001 |

a n =74

b n =74

second and third respectively. The most frequently reported stressors for families of a normal infant were that the pregnancy was not planned (30%), death of a significant other (27%), and moving (24%) in that order (Table 11).

Specific stress management techniques and use of support systems were identified as helpful by parents of a normal infant (Table 12). In order, mothers listed helpful stress management techniques as: talk, cry, keep to self, and exercise. Fathers listed: talk, exercise, and keep to self most frequently. For support, both mothers (69%) and fathers (66%) turned to family members. For mothers 59% reported stress with a 91% satisfaction in stress management. Of the fathers 59% reported stress with 95% reporting satisfaction with stress management.

Table 11

Frequency Distribution of Stress Experiences

| Type of Stress | Number of Parents Experiencing Stress | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Defective Infants[a] | | | | Normal Infants[b] | | | |
| | m | f | Both | % | m | f | Both | % |
| Loss | 11 | 12 | 23 | 31 | 5 | 5 | 10 | 14 |
| Change | 18 | 14 | 32 | 43 | 10 | 7 | 17 | 23 |
| Begin | 6 | 9 | 15 | 20 | 2 | 2 | 4 | 5 |
| Finish | 2 | 5 | 7 | 9 | 4 | 0 | 4 | 5 |
| Move | 9 | 7 | 16 | 22 | 8 | 10 | 18 | 24 |
| Death | 12 | 13 | 25 | 34 | 10 | 10 | 20 | 27 |
| Illness | 19 | 18 | 37 | 50 | 3 | 4 | 7 | 9 |
| Problem | 8 | 10 | 18 | 24 | 5 | 4 | 9 | 12 |
| Planned | 10 | 12 | 22 | 30 | 13 | 9 | 22 | 30 |

a n =74 mothers (m), 74 fathers (f).

b n =74 mothers (m), 74 fathers (f).

Table 12

Stress and Support in Parents of a Normal Infant

| Stress | Mothers | | Fathers | |
|---|---|---|---|---|
| Experienced | | | | |
| | number | percent | number | percent |
| Yes | 22 | 59% | 25 | 59% |
| No | 15 | 41% | 10 | 29% |
| Stress Mgt.[a] | | | | |
| talk | 32 | 58% | 27 | 65% |
| exercise | 2 | 4% | 6 | 14% |
| keep to self | 8 | 14% | 6 | 14% |
| cry | 13 | 23% | 0 | |
| other | 1 | 1% | 3 | 7% |
| Support[a] | | | | |
| family member | 22 | 69% | 19 | 66% |
| professional | 2 | 6% | 1 | 3% |
| church | 3 | 9% | 2 | 7% |
| other | 5 | 16% | 7 | 24% |
| Satisfaction | | | | |
| Yes | 30 | 91% | 21 | 95% |
| No | 3 | 9% | 1 | 5% |

□ =37 mothers, 37 father

[a] Note : more than one response could be checked

## Discussion

### The Findings

This study explored the differences in levels of prenatal parental stress experienced by parents who have normal infants and those whose infants are born with birth defects. Statistically higher levels of prenatal parental stress were experienced by the group of parents of infants with birth defects. In this group of 37 infants, 14 had birth defects of unknown etiology (Horan, 1983).

The most frequently experienced stressors for parents of an infant with birth defects included: illness of a significant person, change of job, and death of a significant other. These areas were associated with long term stressors. These stressors are not easily resolved and have long term implications on the family system. Within the framework of the General Adaptation Syndrome, the impact of long term stressors on the body causes the body to excrete corticoids plus depletes vital growth hormones and prolactin which wear down the body's systems and defenses. It is reasonable to assume that a fetus exposed to such an environment would be at

risk for abnormal development.

Limitations

Limitations of the study include sample size and recruitment. The samples may have been atypical of the population of prenatal parents. The non-probability convenience sampling utilized in this study may have induced bias. For both groups, the prescreening and referral process utilized by the researcher may have been a potential source of bias.

Additional limitations are imposed by the fact that the data for the study were collected after the infant's birth. Parents of an infant with birth defects, especially a defect of unknown cause, may search for a prenatal reason for the defect. They may therefore tend to focus on stressful life events to search out a cause for the infant's defect. Parents of a normal infant may fail to remember or note a stressful life event in the happiness over a normal infant. In an effort to elicit true responses, both sets of parents were asked to recall specific events making it less likely that they would fail to remember responses.

Further, the number and types of stressors

identified could be expanded in a further study. For example, stressors such as marital, interpersonal, or health could be included. Stress management techniques were not asked of the group with an infant with birth defects. It is possible that the group used such techniques but that they were not successful or that they used different ones.

Implications for Nursing Practice

The findings of this study are significant for nursing as nurses interact and care for pregnant mothers and families in a variety of settings. Within the theoretical framework of Martha Rogers, it is recommended that nurses assess real and potential sources of stress for expectant parents considering the context of the environmental field. A life events scale such as "The Social Readjustment Rating Scale" is one stress assessmsnt tool (Homes & Rahe). Modifications of a stress assessment tool should focus on long term stressors. Nursings' use of a stress awareness tool would help prospective parents become more aware of stressful patterns in their lives and to utilize successful stress management and support systems in an effort to repattern their responses to stress. Parents may be advised to plan

their pregnancies during periods of their lives which tend to be less stressful.

With careful evaluation of prenatal parental stressors, the nurse can assist the prospective parents to plan and to implement successful stress management. The data suggest that using a family member to talk to is one of the most effective stress management tools. Nurses can suggest and reinforce this concept. The nurse can help the family members talk to each other so that they understand how each other preceives the stressors. Mothers of normal infants who identified prenatal parental stress reported less successful stress management than fathers (91% vs. 95%, Table 12). With less mothers reporting sucessful stress management there is a need to expand successful stress management techniques. Helping mothers to use exercise is proposed as an effective stress management tool. For example, 14% of the fathers found exercise helpful while only 4% of the mothers did (Table 12).

Through the effective use of stress management, the harmful effects of stress on the mother's and therefore the fetus's body are minimized. It is then proposed that the family will enhance the probability

of the birth of a normal infant.

Recommendations for Further Research

That there may be a difference in the level of stressors experienced prenatally by parents who have normal infants and those whose infants are born with birth defects has far and wide reaching implications for society. Further research is indicated to replicate and substantiate the findings. Further research needs to look at high levels of long term stress to see if and how it is possible to mediate the stress.

The following recommendations for future research are suggested:

1. Replicate the study utilizing random sampling techniques and a larger sample size.
2. Design a prospective study to document stress and observe for the incidence of birth of an infant with defects.
3. Design and utilize an instrument that would test a broader range of stressors perhaps utilizing a more complete life events testing.
4. Further explore and expand the successful stress management techniques and support systems.

In conclusion, this study contributed to the

knowledge base regarding prenatal parental stress and pregnancy outcome. Nursing practice implications have been suggested. Recommendations for further research have been outlined.

APPENDIX A

Card No. 0 1 (1-2) I.D. ___ (3-5) ___

Interviewee ___ (6) Int. No. ___ (7)

Site ___ (8) Counselor ___ (9)

Date ___ ___ ___ ___ ___ ___ (10-15)

PARENTAL ADJUSTMENT PROJECT

Basic Information

In this interview I will be asking you a number of questions. Some of them can be answered by short answer or checking, and others by selecting from a choice of responses. I will go over the instructions with you each time there is a change in the answer format.

The first questions are basic informational items:

1. Age in years at next birthday: _____ ___ ___ (16-17)

2. Education—highest level of schooling completed:

_____ 1. less than high school
_____ 2. high school graduation
_____ 3. vocational program
_____ 4. some college
_____ 5. college graduation
_____ 6. masters degree
_____ 7. doctorate ___ (18)

3. Next, I'd like to show you a table of levels of income and have you tell me which level is closest to your family's total income. These are broad ranges of income. I don't need to know the specific amount, just think of your family's total income for the past 12 months.

_____ 1. less than $3,000
_____ 2. $ 3,000 to $ 4,999
_____ 3. $ 5,000 to $ 6,999
_____ 4. $ 7,000 to $ 9,999
_____ 5. $10,000 to $14,999
_____ 6. $15,000 or more ___ (19)

4. Occupation: _____ ___ (20)

5. Religious affiliation:

_____ 1. Catholic
_____ 2. Jewish
_____ 3. Protestant
_____ 4. Other
_____ 5. None ___ (21)

6. Race: _____ 1. Black _____ 2. Caucasian _____ 3. Hispanic
_____ 4. Other (specify): _____ ___ (22)

7. Present marital status: _____ 1. Married _____ 2. Single ___ (23)

8. Years married at next anniversary: _____ ___ ___ (24-25)

9. Ages and sexes of other children residing with you (Circle sex and write in age):

| | | | | | |
|---|---|---|---|---|---|
| Child 1 | 1. Male | 2. Female | _____ years old | | (26-28) |
| Child 2 | 1. Male | 2. Female | _____ years old | | (29-31) |
| Child 3 | 1. Male | 2. Female | _____ years old | | (32-34) |
| Child 4 | 1. Male | 2. Female | _____ years old | | (35-37) |

Other people residing with the family: (specify) (38)

10.

11. Now I am going to read you a list of things that happen to people. As I read them, I would like you to indicate if your family has experienced any of them in the past year.

a. Loss of job ___1. Mother ___2. Father ___3. Both ___4. Neither (41)

b. Change of job ___1. Mother ___2. Father ___3. Both ___4. Neither (42)

c. Moving _____ 1. Yes _____ 2. No (43)

d. Beginning School
_____ 1. Yes ⟶ Which family member (Write in) _____
_____ 2. No (44-45)

e. Finishing School
_____ 1. Yes ⟶ Which family member (Write in) _____
_____ 2. No (46-47)

f. Death of a significant person
_____ 1. Yes ⟶ Which family member (Write in) _____
_____ 2. No (48-49)

g. Illness of a significant person
_____ 1. Yes ⟶ Which family member (Write in) _____
_____ 2. No (50-51)

h. Problems with parents
_____ 1. Yes
_____ 2. No (52)

i. Any other
_____ 1. Yes ⟶ Specify _____
_____ 2. No (53-54)

12. Do you consider your last pregnancy to be planned?

_____ 1. Yes
_____ 2. No (55)

13. Baby's birthday: Month _____ Day _____ Year _____ (56-61)

Baby's sex: _____ 1. Male _____ 2. Female

APPENDIX B I.D._____ __(3-5)

Site_____ Date_____ __(8) ___(13-15)

PARENTAL EXPERIENCES

1. This is a list of things that happen to people. Please indicate if you or your family has experienced any of them in the year before your baby was born.

a. Loss of job __1. Mother __2. Father __3. Both __4. Neither __(41)

b. Change of job __1. Mother __2. Father __3. Both __4. Neither __(42)

c. Begin school __1. Mother __2. Father __3. Both __4. Neither __(44)

d. Finish school __1. Mother __2. Father __3. Both __4. Neither __(46)

e. Moving __1. Yes ____2. No __(43)

f. Death of a significant person

1. __Yes - (check) __a. family member __b. friend __c. list other __(48)

2. __No

g. Illness of significant person

1. __Yes (check) __ a. family member __b. friend __c. list other __(50)

2. __No

h. Problems with parents ____1. Yes _____2. No ___ (52)

i. Any other

___1. Yes Specify ___(53)

____2. No __(54)

j. Was your pregnancy planned? __(55)

___1. Yes

2. No

2. The following questions relate to stress and support during the year before your baby was born. Please feel free to use the back of the page if you have additional comments.

a. When you have a problem what do you do?

__1. talk __2. exercise __3. keep to myself __4. cry __5. Other __(66)

b. Have you felt stress during the pregnancy?

___1. Yes

____2. No ___(67)

c. If you felt stressed who did you turn to?

__1. family member, relationship? _____ __(68)

__2. health care professional, list _____ __(69)

__3. church __(70)

__4. other, list _____ __(71)

d. Were you satisfied with the help that you got?

__1. Yes

__2. No __(72)

The following questions are basic informational items:

3. Age in years at next birthday _____ __(16-17)

4. Education-the highest level of schooling completed __(18)

__1. less than high school __4. some college

__2. high school graduation __5. college graduation

__3. vocational program __6. masters degree

__7. doctorate

5. Please estimate your family's total income for the past 12 months __(19)

__1. less than $3,000 __4. $10,000 to $15,000

__2. $3,000 to $5,000 __5. $15,000 to $20,000

__3. $5.000 to $10,000 __6. $20,000 or more

6. Occupation _____ __(20)

7. Religious affiliation:

__1. Catholic __2. Jewish __3. Protestant __4. Other 5. None __(21)

8. Race: __1.Black __2. Caucasian __3. Hispanic __4. Other list __(22)

9. Present marital status: __1. Married __2. Single __(23)

10. Years married at next anniversary _____ __(24-5)

11. Baby's birthdate:__month__day__year Baby's sex __1.Male __2. female _____(56-61)

Ages and sexes of other children living with you (circle sex and write in age)

Child 1 1. Male 2. Female ___ years old ___ ___ (26-28)

Child 2 1. Male 2. Female ___ years old ___ ___ (29-31)

Child 3 1. Male 2. Female ___ years old ___ ___ (33-34)

Child 4 1. Male 2. Female ___ years old (38)

Other people living with the family: (specify) ___ ___ (35-37)

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# AUTOBIOGRAPHICAL STATEMENT

Name: Joanne E. Neihardt

Birth: April 4, 1945, Detroit, Wayne County, Michigan, U.S.A.

Education: Henry Ford Hospital School of Nursing, 1963-4; Northwestern Michigan College, A.D.N. Degree 1970; Central Michigan University, coursework 1975-83; University of Michigan College of Nursing, B.S.N. 1979; Michigan State University College of Nursing coursework 1979-83; Wayne State University College of Nursing graduate studies 1981-4. M.S.N. 1984

Positions: Staff Nurse, Munson Medical Center, Traverse City, Michigan 1970-79; Clinical Instructor, Ferris State College, Big Rapids, Michigan 1979; Public Health Nurse Tri-County Health Department, Traverse City, Michigan 1979-84; Infant-Parent therapist, Northwestern Michigan Child Guidance Clinic Traverse City, Michigan 1984.

Honors: "Who's Who in American Universities and Colleges", University of Michigan School of Nursing; Association of Operating

Room Nurses Scholarship 1977-1984; Federal Traineeship Wayne State University.

Memberships: American Nurses Association,
Association of Operating Room Nurses
Michigan Nurses Association
Traverse City District Nurses

Publications: Obtaining a B.S.N. (Dec. 1981) Speaking Out, Association of Operating Room Nurses Journal.